Dugway Proving Ground
Restoration Advisory Board Meeting

May 12, 2008
Army Community Services Building – Building 5124
Dugway Proving Ground, Utah

UPDATE
RCRA Facility Investigation

Emily Hart Hayes
Senior Scientist, Parsons

Presentation

- **Status of RFI for SWMUs**
- **Work Completed Since November 2007**
- **Current Field Work**
- **Future Work Activity**
- **Briefing: Sub-slab Soil Vapor Sample Results and Preliminary Human Health Risk Results at Ditto Technical Laundry Facility (SWMU-177)**

RCRA Corrective Action Process

- Solid Waste Management Units (SWMU) Definition
  - "Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released."
- Four Main Steps
  - RCRA Facility Assessment (RFA)
  - RCRA Facility Investigation (RFI)– Phase I
  - RCRA Facility Investigation (RFI)– Phase II
  - Corrective Measures Study (CMS)

Report Process

- RFI reports undergo 3 iterations
  - DRAFT: Internal Army review includes DPG and Corps of Engineers; comments submitted and resolved
  - DRAFT-FINAL: Submitted to UDEQ for review; comments submitted and resolved
  - FINAL: Incorporates all UDEQ comments; legally-binding document incorporated into DPG's RCRA Part B Permit
- Same process for other documents (e.g., Work Plans; Work Plan Variances)

Status of RFI SWMUs

Priority 1 (*32 SWMUs*)

- **21 SWMU RFI Final Reports DSHW Approved**
  - **SWMUs 3, 16, 17, 18, 21, 44, 52, 54, 65, 79, 98, 172, 180, 194 (A,B,C), 199, 200, 207, 212, 213, and 215**
- **4 SWMU RFI Final Reports in Preparation**
  - **SWMUs 41, 60, 173, and 177**
- **4 SWMUs in RFI Draft Stage**
  - **SWMUs 4, 32, 192, and 208**
- **2 SWMUs with Upcoming Removal Actions or Further Investigation Needed**
  - **SWMUs 15 and 35**

Status of RFI SWMUs

Priority II (*39 SWMUs*) (cont.)

- **33 SWMU RFI Final Reports Approved by DSHW**
  - **SWMUs 6, 8, 10, 19, 23, 25, 56, 56B, 75, 77, 97, 113, 115, 116, 118, 133, 150, 154, 171, 179, 183, 185, 188, 189, 193, 197, 201, 205, 206, 211, 214, and 216**
- **1 SWMU RFI Final Report in Review by UDEQ**
  - **SWMU 61**
- **3 SWMUs with RFI Reports in Draft Stage**
  - **SWMUs 31, 209, 210**
- **1 SWMU with Draft Final Report in Preparation**
  - **SWMU 11**
- **1 SWMU with Upcoming Removal Actions or Further Investigation Needed**
  - **SWMU 114**

Work Completed Since November 2007

Reports Submitted

- Final RFI Report for SWMU-61
- Draft RFI Reports for SWMUs 4, 32, 60, 192, 209, and 210
- Responses to State Comments on three RFI Reports (SWMUs 41, 61, 173)
- Work plan for SWMU-15 (surface soil sampling)

Work Completed Since November 2007 (cont.)

Field Work (Spring, 2008)

- **Groundwater and surface soil sampling at SWMU-11**
- **Additional Round of groundwater and soil boring sampling at SWMU-97 for groundwater remediation research.**

Removal Actions (Winter 2007/2008)

- **Waste at SWMU-31**
- **Drums at SWMU-208**
- **Waste at SWMU-209**
- **Waste at SWMU-210**

SWMU-11: Former Radioactive Waste Storage Site and Location of Burning of Beryllium-Containing Propellant

Granite Mountain

Drilling of Soil Boring

SWMU-208: Buried Drums East of Carr

Initial Site Conditions

Sampling for CWA

SWMU-208: Buried Drums East of Carr (cont'd)

Removal of Drums into Overpacks

Excavation of Underlying Soil

SWMU-208: Buried Drums East of Carr (cont'd)

Awaiting Analysis

Site Removal Complete and Backfilled

SWMU-209: Biological Test Plots, Northwest of Baker

Initial Site Conditions

SWMU-209: Biological Test Plots, Northwest of Baker (cont'd)

Removal Operations

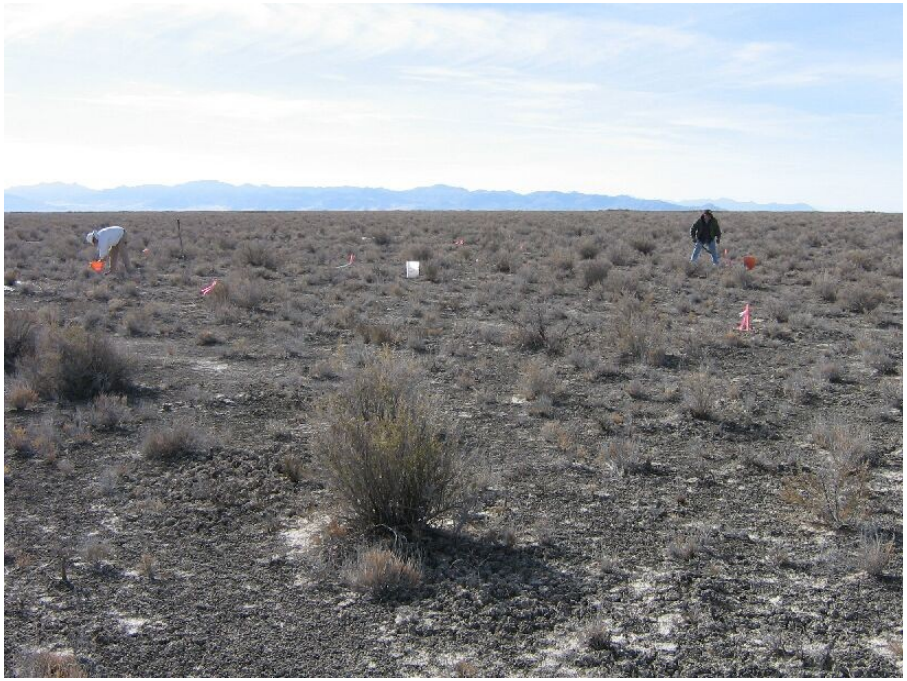
SWMU-209: Biological Test Plots, northwest of Baker (cont'd)

Site Removal Complete

SWMU-210: Glass Disposal Site, South of Baker

Initial Site Conditions

SWMU-210: Glass Disposal Site, southwest of Baker (cont'd)



Removal of Glassware

SWMU-210: Glass Disposal Site, southwest of Baker (cont'd)

Site Removal Completed and Backfilled

Future Field Work

RFI Field Work *– Spring/Summer 2008*

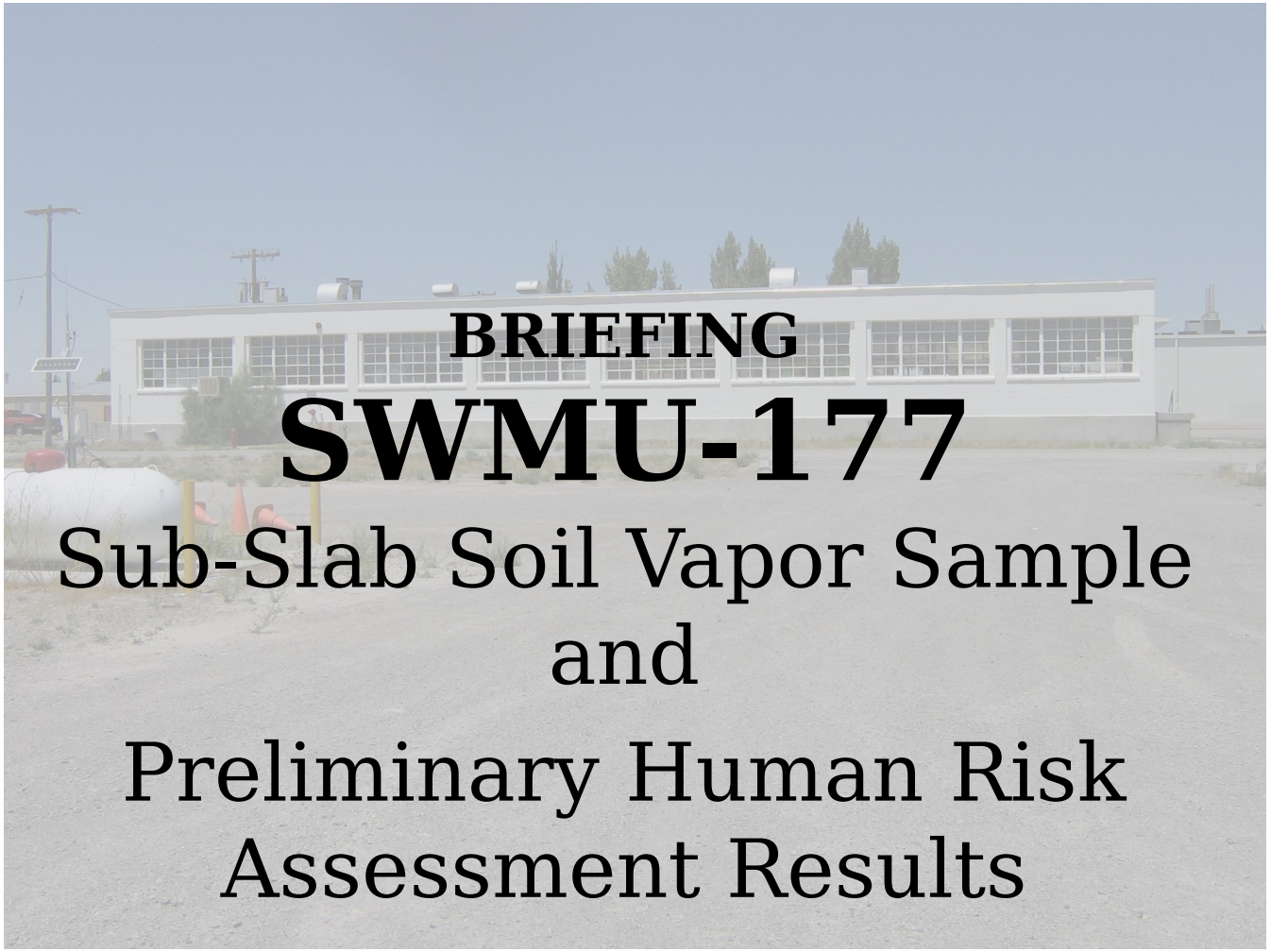
- **SWMU-15 (soil sampling Old River Bed Tunnels)**

Removal Actions – *Spring/Summer 2008*

- **SWMU-35 (Former Baker Lab water treatment plant)**
- **SWMUs 4 and 114**

Future Report Activity

- **Final RFI Reports for SWMUs 41 and 173**
- **Revisions to Final RFI Report for SWMU 61**
- **Draft-Final RFI Reports for SWMUs 11, 60, 209, and 210**
- **Draft RFI Reports for SWMUs 31, 35, 114, and 208**



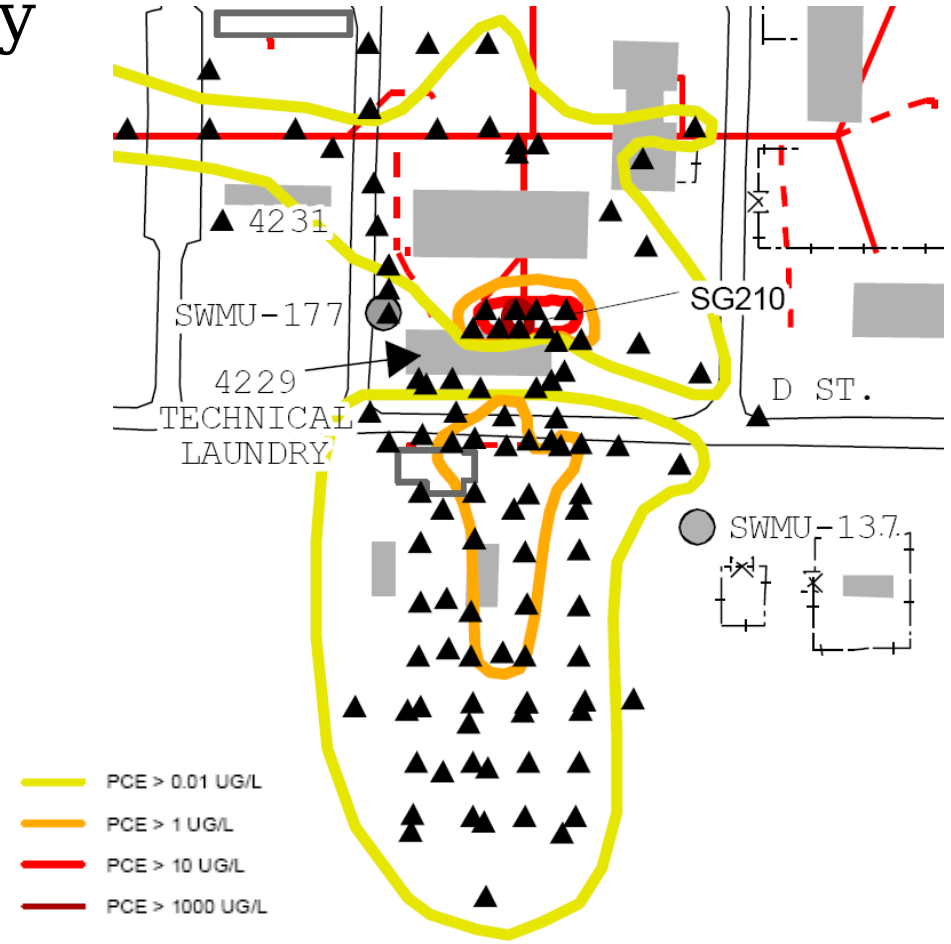
BRIEFING

SWMU-177

Sub-Slab Soil Vapor Sample and Preliminary Human Risk Assessment Results

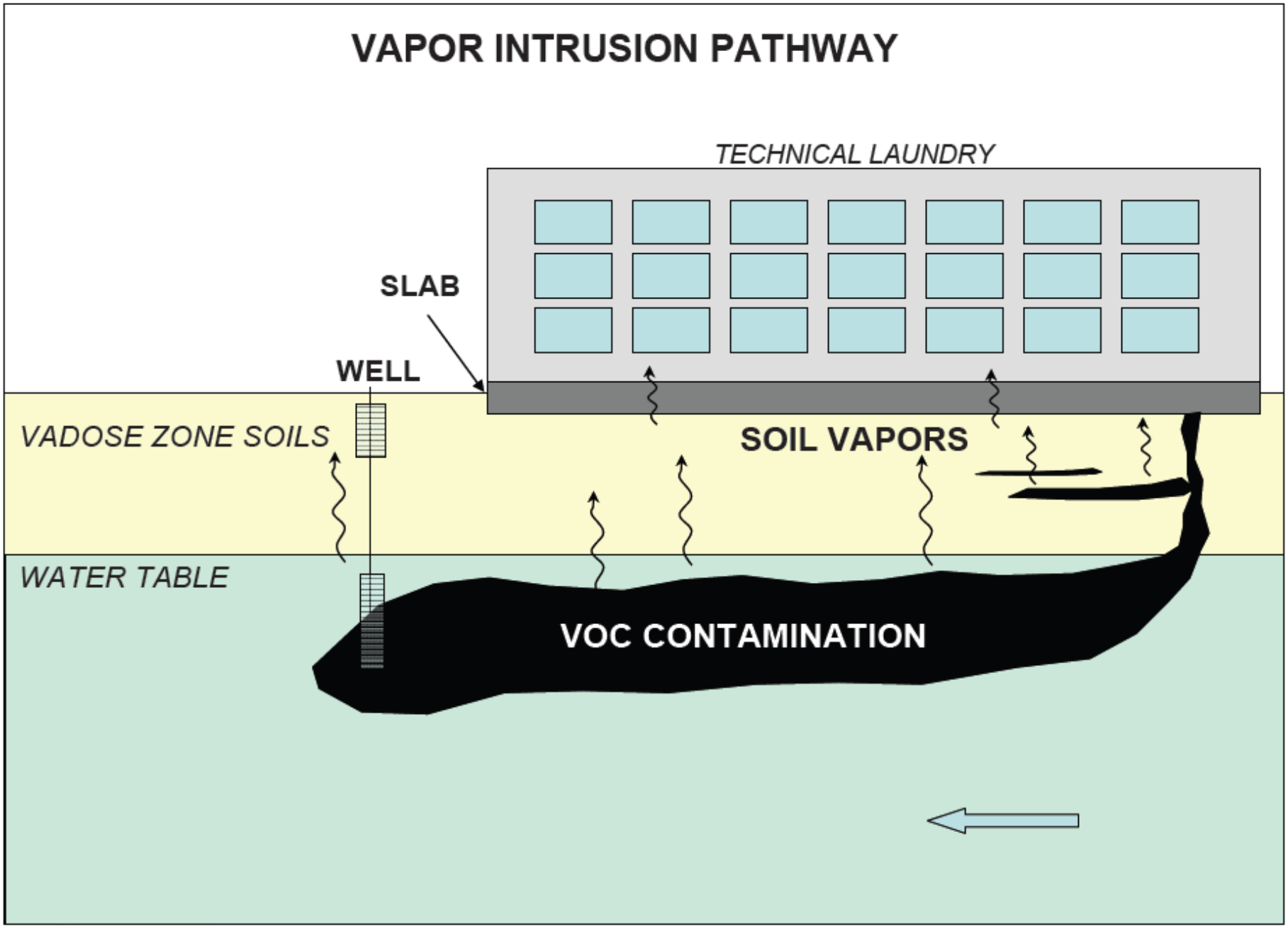
SWMU-177 Technical Laundry Building

- PCE (tetrachloroethylene) previously used in dry cleaning at technical laundry building
- PCE soil gas plume
- Screening results indicated potential for human health risks from vapor intrusion pathway



What is Human Risk Assessment?

- Method to determine whether concentrations of contaminants in the environment have the potential to cause adverse health impacts to people that may come into contact with those contaminants.
- Vapor Intrusion is one **exposure pathway** by which people may be exposed to contaminants in the environment.
- The State of Utah regulates the level of risk


VAPOR INTRUSION PATHWAY
TECHNICAL LAUNDRY
SLAB
WELL
VADOSE ZONE SOILS
SOIL VAPORS
WATER TABLE
VOC CONTAMINATION

What is Sub-slab Soil Vapor Sampling?

- Sampling of contaminants in the vapor phase that may collect in the pore spaces of soil immediately beneath the foundation of a building.
- Sub-slab soil vapor sampling is one step in evaluating the Vapor Intrusion exposure pathway in Human Risk Assessment.

Why Sub-Slab Soil Vapor Samples?

- Sub-slab samples collected to **confirm or deny the presence of elevated PCE** in soil vapor beneath the building;
- Concentrations of VOCs beneath the building better represent concentrations available to migrate **into** the building.

Sub-Slab Soil Vapor Results

- The primary risk driver, PCE, was detected beneath the building, at a maximum concentration of 60 µg/L.
- TCE (trichloroethylene) was the only other VOC detected in sub-slab soil vapor samples.

SG-ADV
Version 2.0; 02/03

Reset to Defaults

Soil Gas Concentration Data

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Soil gas conc., C_s ($\mu g/m^3$)	OR	ENTER Soil gas conc., C_s (ppmv)	Chemical
127184	5.97E+04			Tetrachloroethylene (PCE)
79016	1.88E+03			Trichloroethylene (TCE)

MORE ↓

ENTER Depth below grade to bottom of enclosed space floor, L_f (cm)	ENTER Soil gas sampling depth below grade, L_s (cm)	ENTER Average soil temperature, T_s (°C)	ENTER Totals must add up to value of Ls (cell F24) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
15	30	11	30	0	0	C		
15	30	11	30	0	0	C		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
C	1.43	0.459	0.215								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.83	5

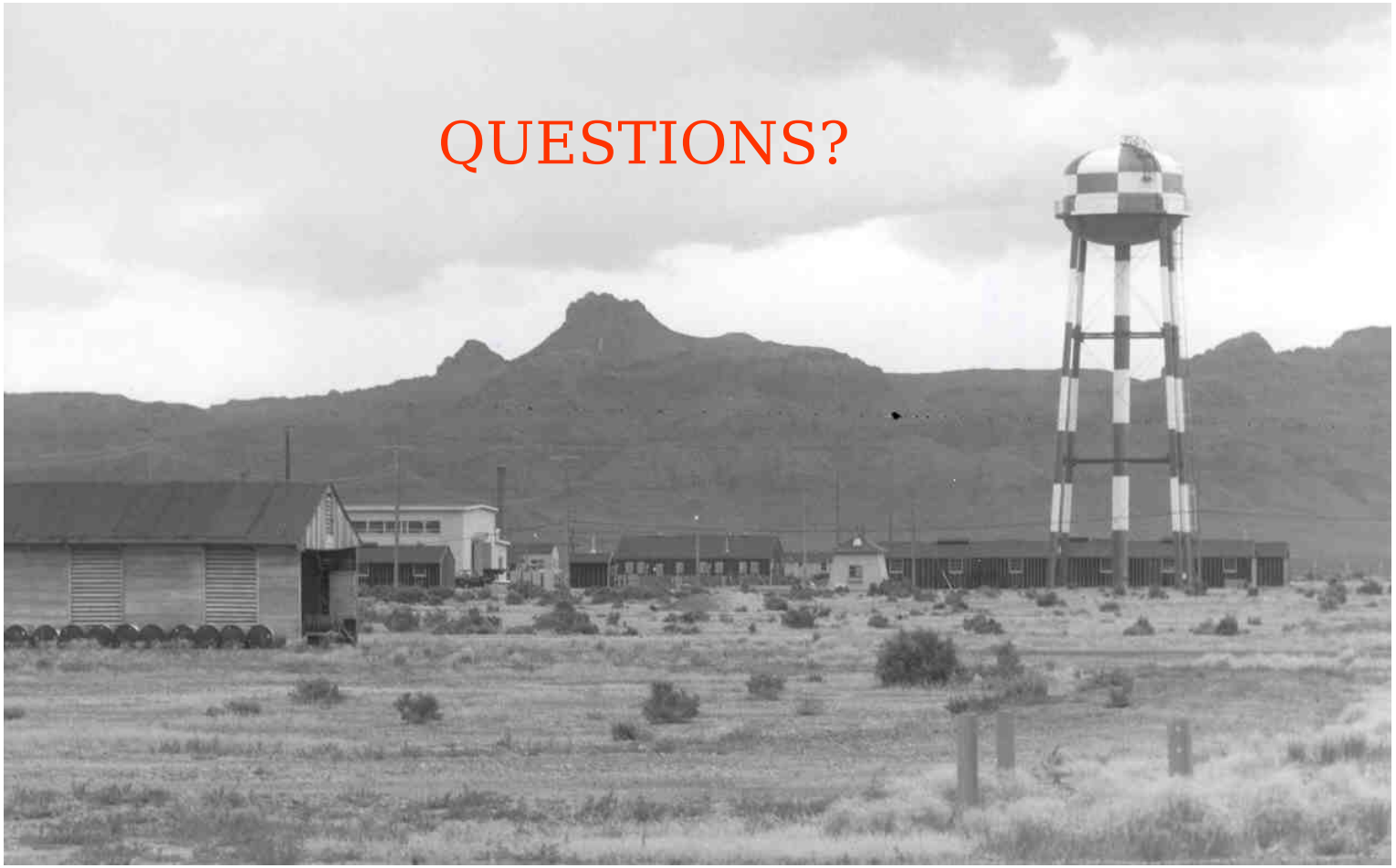
ENTER Averaging time for carcinogens, AT_c (yrs)	ENTER Averaging time for noncarcinogens, AT_{nc} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)
70	25	25	250

Preliminary Human Risk Assessment Results

- Cumulative Cancer Risk =
- 9E-05 (9 in 100,000)
- Noncancer Hazard Index = 1
- Cancer Risks and Noncancer Hazards are at the target industrial levels (risk = 1 in 10,000 and HI = 1) regulated by the State of Utah
- Unacceptable risks to human health are not expected based on model results.

$$Risk = \frac{URF \times EF \times ED \times C_{building}}{AT_C \times 365\ days/yr}$$

$$HQ = \frac{EF \times ED \times \frac{1}{RfC} \times C_{building}}{AT_{NC} \times 365\ days/yr}$$


QUESTIONS?